
Space Weather Forecast

Issued on Thursday 21 November 2024 at 12:17 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Slight chance of Minor Radio Backouts (R1) throughout. Periods of slight chance of Minor Geomagnetic Storm (G1) to start and end forecast period.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Moderate, with the largest flare a low-end Moderate-class flare at 20/1941UTC, most likely from a departing sunspot region on the southwestern solar horizon. The X-ray trace was otherwise very subdued, with a few low-end Common-class flares observed.

There are currently up to ten sunspot regions on the facing side of the Sun. The main regions include one in the southeast, which comprises several symmetric penumbral leading spots, some of which have proliferated and migrated west in the period, with small trailing spots and pores. This region has several 'filaments' (arcs of plasma) strung through its trailing portion, making it potentially one to watch should it flare appropriately (for CME risk, especially as it nears the solar meridian). Further west, two other sunspot groups showed mixed fortunes: the southernmost showed emergence and spreading of new spots in the period in the southwest, while the other (in the northwest) showed spreading and areal decline. The majority of the remaining groups were small magnetically unipolar regions.

The Sun is currently quite starkly polarised in satellite imagery showing the Sun's magnetic field, which numerous small filaments and 'prominences' populating the facing side (both arcs of plasma, either on the Sun's front side or edge - as viewed from Earth). A small filament eruption was observed leaving the southeast on ground-based near-infrared imagery and some extreme UV satellite imagery around 21/0100UTC. This feature has been modelled and determined to be a most likely miss below and behind the Earth, crossing the radius of the Earth's orbit into the UTC evening of Saturday 23 November. Other filament and prominence-based activity was otherwise clear of the Sun-Earth line, and no Earth-directed CMEs were in evidence over the past 24 hours in available imagery.

Solar Wind / Geomagnetic Activity: Solar winds continued to show a slow regime. The solar wind speed was within background levels throughout, possibly with a slight rising tendency in the current UTC day. The number of particles in the solar wind was also within background levels, but again with a rising trend - there is a possibility this may be a sign of an inbound fast wind, however this is conjectural. The associated magnetic field was variable, with slightly elevated highs. The north-south component was initially mainly co-aligned with the Earth's field, but also developed a more erratic tendency as the period went on.

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The net result of the above solar wind measures was provisionally quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is expected, with a slightly falling chance of M-class flares with the departure of two recent larger sunspot groups.

Solar Wind / Geomagnetic Activity: No Earth-directed CMEs currently feature in the forecast.

A pair of 'coronal holes' (sources of fast solar wind) are due in the forecast period: firstly within the first 24 hours and again later in the UTC weekend. There is a slight chance of Minor Geomagnetic Storm (G1) for both, with an intervening lull.

Energetic Particles / Solar Radiation: There is a falling slight chance of S1/Minor Solar Radiation storms over the period, chiefly due to any potential significant flaring from two recent front-sided departures, with negligible additional contribution from the Earth-facing sunspot groups.

Geomagnetic Storms

Geomagnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	5	10	1	20
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	Yes	50	40	40	40
Very Active	R3-R5 (X Class)	No	5	1	1	1

Solar Radiation Storms (High Energy Protons)

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = cm ⁻² sr ⁻¹ s ⁻¹)						